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5.5.2 Food Service/Laundry Equipment

Food service and laundry equipment can be some of the heaviest consumers of energy and water. New types of high-capacity, multistage dishwashing machines, high-efficiency refrigerators, advanced cooking equipment, and new clothes washers provide significant opportunities to save resources and money. In each case, heat recovery systems can be used to capture waste energy from appliances and use it to preheat air for HVAC purposes or to preheat water.

Opportunities

Make energy efficiency and water efficiency key considerations when outfitting a new kitchen or laundry for a Federal facility, as well as when renovating these spaces or replacing individual pieces of equipment. In certain situations, replacement will be justified solely on the basis of energy savings. Also consider measures to recover waste heat at the time of new equipment selection or kitchen/laundry renovation.

Technical Information

DISHWASHERS

New high-capacity, multistage dishwashing machines are designed for medium-to-large food service operations, including hospitals, colleges, hotels, and restaurants. In addition to reducing water usage and load requirements, labor requirements for operation are reduced by 50%.

Multistage dishwashers reuse water from the two rinse stages to prewash dishes. In addition to reducing water consumption, these devices save a considerable amount of detergent and rinse additives. Because of their improved design, breakage is also significantly reduced.

Power scrapers are available for some dishwasher models that remove caked-on, dried food. This can be particularly useful when there is a significant time lag between use and washing.

Typical throughput of dishes in a high-capacity, multistage washing machine is 3,500 to 3,700 dishes per hour, with a conveyor speed of 5 to 6 feet (1.5 to 1.8 m) per minute.

A recent Department of Defense cafeteria installation of the new multistage dishwashing equipment cost $57,800. The result was a water reduction of 500,000 gallons (1,900 m^3) per year, saving $2,000 per year. Labor savings were $19,000 per year. The payback time for this installation was 2.7 years, and it will save almost $500,000 over its 25-year projected life.

REFRIGERATORS AND FREEZERS

In commissaries, refrigerators and freezers can account for up to 50% of energy consumption. Energy efficiency advances in commercial refrigeration have paralleled those in residential refrigeration since the 1970s.

Refrigerators and freezers are divided into medium-temperature (MT) systems—down to 20°F (-7°C)—and low-temperature (LT) systems—down to -25°F (-32°C).

New equipment is available with EERs of 7 to 9 for MT systems and 5 to 6 for LT systems. Replace old, inefficient systems with high-efficiency, new systems to obtain significant savings immediately.

Relying on refrigerator cases to cool the interior of a space is not very useful, as HVAC systems typically have EERs of 10 to 12 versus the 5 to 9 for refrigeration equipment. This translates to a difference of 40% in energy use. Air spillage from the refrigeration equipment should be minimized.

Product literature specifies proper operation and maintenance of refrigerators and freezers. Some of the causes of excessive energy use by these devices are controls set too low, doors that do not close properly, and worn or torn gaskets. An accurate thermometer is needed to check temperature conditions. Cleaning condenser heat transfer surfaces to remove dirt and scale is very important for proper and efficient operation. Overloading the unit may result in over- or undercooling the stored food.

COOKING EQUIPMENT

The key strategies for saving energy when using cooking equipment are (1) turn equipment off when not in use, (2) use a temperature no higher than necessary, (3) match the equipment to the job, and (4) cook as efficiently as possible. The last step includes adjusting flames on ranges to just touch the bottom of cookware, avoiding unnecessary oven door openings, cooking foods with the same requirements simultaneously, and cooking in volume.

When upgrading a kitchen, consider the following energy-efficient types of equipment: infrared fryers, convection ovens (including steamer models), microwave ovens, and specialized equipment. Specialized equipment (such as a pizza oven) is designed to cook specific foods very efficiently. Computerized controls can also produce savings by automatically timing the cooking of certain foods.

Energy-efficient exhaust hoods can provide significant savings because they use outside air rather than inside conditioned air for ventilation. Side curtains

Source: Bruce Wagman Photography/Maytag

Maytag's commercial H-axis Neptune washer uses significantly less water and energy than top-loading models.

around cooking equipment can help restrict the flow of conditioned air to the outside. Exhaust air also can be used to preheat air for HVAC purposes or to preheat water.

LAUNDRY EQUIPMENT

Horizontal-axis (H-axis) washing machines are far more energy- and water-efficient than conventional top-loading, vertical-axis machines. American manufacturers have only recently begun to reintroduce H-axis equipment for residential use. H-axis commercial equipment has been available for many years, but new products (based on residential models) have been introduced recently. One manufacturer has designed a resource-efficient vertical-axis residential washer that performs far better than typical top-loaders and meets ENERGY STAR® standards. Look for washing machines that meet ENERGY STAR requirements for water and energy savings.

Laundry water temperatures should be reduced to 160°F (71°C) unless prohibited by code. Some soaps and detergents perform well at lower temperatures and should be used where appropriate. Temperatures should be checked with an accurate thermometer, and equipment should be adjusted as needed.

Microcomputers on newer-model laundry equipment permit the precise control of water temperature, wash cycles, and drying.

Large commercial laundries should consider water recycling and batch tunnel washers as water-conservation measures. Continuous-batch machines conserve water and energy, as do machines that recycle the final rinse for use as the first wash on the next batch.

Using equipment efficiently means ensuring that washing machines and dryers are operated with full loads rather than partial loads.

To reduce energy use by clothes washers and dishwashers: repair leaks, insulate storage tanks and distribution piping, clean sediment out of equipment, and test/tune-up water-heating components.

OTHER KITCHEN AND LAUNDRY IMPROVEMENTS

Add drainline heat-recovery equipment where practical. These units can capture a significant portion of the heat from hot water going down the drain (see *Section 5.3.1 – Heat-Recovery Water Heating*).

Replace conventional garbage disposals with pulpers. These recirculate a portion of the water instead of washing it all down the drain. Some systems allow ground-up materials to be composted instead of disposed of in the sewer system.

Provide foot controls on sinks. These permit easy control of sinks and can save tremendous quantities of water in situations where water is commonly left running throughout a specific task. Water can be turned on and off without changing the temperature mix.

Install low-flow faucet tops for sinks that provide adequate waterflow but no more than needed (see *Section 6.3 – Showers, Faucets, and Drinking Fountains*). Aerating devices should be avoided, particularly in health facilities, because the screens can harbor germs and pathogens. Flow restrictors should be avoided.

References

The Most Energy-Efficient Appliances – 1999 Edition, American Council for an Energy-Efficient Economy (ACEEE), Washington, DC; www.aceee.org.